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EXAMINER
PALABRICA, RICARDO J

ART UNIT	PAPER NUMBER
3641	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/964,624	Applicant(s) HEMMI ET AL.
	Examiner Rick Palabrica	Art Unit 3641

-- The MAILING DATE of this communication appears on the cover sheet with the corr spondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *5-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-4 (Process of Controlling Water Quality) in Paper No. 7 is acknowledged. The election of species requirement for Group I is withdrawn. However, if claims specific to the different species as set forth in sections 2-4 of the 4/16/02 Office Action are presented for Group I, said election of species requirements will be re-instated.

2. The applicant traversed the Restriction Requirement on the grounds that a search and examination of the entire application would not place a serious burden on the examiner. This is not found persuasive because, as stated in the 4/16/02 Office Action, the two groups of invention have acquired a separate status in the art as shown by their different classification, thereby requiring different search and examination. The separate searches for the two groups will not be co-extensive.

The requirement is still deemed proper and is therefore made FINAL.

Specification

3. The disclosure is objected to because of the following informalities:

- On page 7, line 22, the word, "form" should be changed to "from,"
- On page 9, the use of the trademarks "Stellite" and "Colmonoy" has been noted. A trademark should be capitalized wherever it appears and be

accompanied by the generic terminology. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

- On page 13, line 14, the definition of the acronym "EFPH" is incorrect.
- On page 14, line 8, the word "routs" should be changed to "routes"; on line 23, the word "from" should be changed to "form"; on line 29, the word "of" should be changed to "on".
- On page 17, line 15, "pump 26" is discussed but not shown in Fig. 2.

Appropriate correction is required.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e., failing to provide an enabling disclosure.

The claimed invention is a method for controlling water quality in a nuclear reactor comprising the limiting of the amount of iron and nickel, with the amount of iron

being at least twice the amount of nickel. However, there is no adequate or enabling disclosure of how such could be accomplished using the applicant's invention.

On page 3, 2nd full paragraph of the specification, it is stated that, "An amount of iron contained in system water such as supply water supplied into the nuclear reactor is limited up to 0.10 ppb and preferably up to 0.04 ppb as an upper limit value, and more preferably limited up to zero as closely as possible. In such a case, a nickel concentration in the reactor water is maintained not so to be less than 0.2 ppb."

Based on the above, controlling the nickel concentration is a critical step in the claimed method. However, it appears that the disclosure focuses primarily on controlling the iron concentration. One gets the impression that controlling the iron concentration would automatically take care of the nickel issue. If this is the case, there is neither an adequate description nor enabling disclosure as to how and in what manner the nickel concentration limitation is met by only controlling the iron concentration.

There is neither an adequate description nor enabling disclosure as to how and in what manner an iron concentration of 0.10 ppb (much less 0.04 ppb) could be made to be at least twice a nickel concentration that is held to no less than 0.2 ppb.

Similarly, if the iron concentration is limited to the preferred value of zero, the nickel concentration must be negative in order to obtain an at least two-to-one ratio of iron to nickel concentration. There is neither an adequate description nor enabling

disclosure as to how and in what manner such negative nickel concentration is achieved.

On page 9, lines 3-7 of the specification, it states "The condition for making the amount of iron generated at least twice as much as an amount of nickel may exist in the intermediated portion between 4 ppb as the existing value and zero, depending an extent of reduction in an amount of nickel generated." There is neither an adequate description nor enabling disclosure as to how and in what manner a 4 ppb iron concentration can be maintained and yet be less than the above-mentioned limit of 0.1 ppb for this metal.

The specification indicates various approximations, estimates and assumptions regarding the invention. The disclosure, however, is insufficient in failing to specifically set forth the basis for these estimates, approximations and assumptions. For example:

1) What is the basis for the upper limit of the iron concentration, i.e., will this value be valid for any type of water-cooled nuclear reactor? Will it be independent of the operating parameters or history of the reactor (i.e., power level and fuel failure history)? Does this mean that the iron concentration control for a new reactor will be the same for one that has been in operation for decades and with a history of fuel leakers?

2) It appears that equations (3) and (4) for the iron concentration and nickel concentration, respectively, are used to show that a 0.1 ppb iron concentration for the embodiment of the invention will yield an iron/nickel ratio of at least 2. How valid are these equations for a reactor that has different types/number of primary cooling components (e.g., different material for the condenser tubes and feedwater reheaters), different fuel cladding material, different fuel spacer material than the embodiment of the invention? If a reactor has other water chemistry practices, e.g., stress corrosion cracking prevention by hydrogen addition, what effect would such addition have on the approximations of the iron and nickel concentrations.

For reasons set forth above, the examiner believes there is reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the application itself to inform, not to direct others to find out for themselves (see *In re Gardner et al.*, 166 USPQ 138, *In re Scarborough,* 182 USPQ 198).

Claim Rejections - 35 USC § 112

5. Claims 1-4 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to

make and/or use the invention. The reasons for this rejection are the same as the reasons for the objections to the specification (see section 3 above), and said reasons are accordingly incorporated herein.

6. Claims 1-4 rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The control of nickel concentration is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). As discussed in section 3 above, the specification discloses that the nickel concentration must be maintained to be not less than 0.2 ppb but the disclosure is non-enabling on how this is achieved.

7. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: control of nickel concentration in the method steps. See also section 3 above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1 and 2 rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Nagase et al. (U.S. 4,894,202) [hereinafter referred to as Nagase et al. (202) or Nishino et al. (U.S. 4,927,598) in view of Nagase et al. (U.S. 5,398,269) [hereinafter referred to as Nagase et al. (269)]. Either one of Nagase et al. (202) or Nishino et al. disclose the applicant's claims except for the specific concentration limit on iron in the reactor water.

Nagase et al. (202) disclose a method for inhibiting radioactive substances eluting into the cooling water of a nuclear plant comprising the step of adjusting the Fe/Ni molar concentration ratio in the cooling water from about 2 to 10 (see Abstract and claim 1).

Nishino et al. disclose a method of reducing radioactivity of piping in a primary cooling water recirculation line and various apparatus and devices in a nuclear plant by converting nickel and/or cobalt into nickel ferrite and/or cobalt ferrite (see column 2, lines 13-18). They claim that said conversion can be effected by an Fe/Ni stoichiometric ratio of 2 (see column 4, lines 56-60 and Example 1 on column 5).

Nagase et al. (269) disclose a water quality method in a nuclear power plant that reduces the ^{60}Co ion concentration in the reactor water. They teach that the conventional method of reactor water control using Fe/Ni concentration ratio as control

index is not enough because although it may maintain the ^{58}Co ion concentration at a low level, the ^{60}Co ion concentration possibly increases beyond an estimated level (see column 1, lines 33-41). To address this ^{60}Co problem, they teach a method of controlling iron concentration in the feedwater below 0.1 ppb and below 0.05 ppb (see claims 3 and 4). One having ordinary skill in the art would have recognized the advantage of limiting the iron concentration in addition to controlling the Fe/Ni concentration ratio in the reactor water, i.e., reduced coolant radioactivity and lower potential exposure of plant personnel.

As to the limitation in claim 2 regarding an upper limit of 0.04 ppb for the iron concentration, note that Nagase et al. (269) disclose an iron concentration of "below 0.05 ppb" that anticipates the claimed iron concentration.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of either one of Nagase et al. (202) or Nishino et al. by the teaching of Nagase et al. (269), in order to have a method of controlling water quality in a nuclear reactor comprising the steps of making the amount of iron at least twice the amount of nickel, and limiting the amount of iron up to 0.1 ppb and up to 0.04 ppb, in order to gain the advantages thereof, as this is no more than the application of well known techniques of reactor water quality control within the nuclear art.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over either one of the Nagase et al. (202) - Nagase et al. (269) combination or Nishino et al. - Nagase et al. (269) combination as applied to claims 1 and 2 above, and further in view of any one of Niedrach (U.S. 5,130,081) or Hettiarachchi (U.S. 5,904,991) or Lin (U.S. 5,375,152) or Carter (U.S.4,526,626). Either one of the Nagase et al. (202) - Nagase et al. (269) combination or Nishino et al. - Nagase et al. (269) combination disclose the applicant's claims except for the preliminary oxidation treatment of nickel base alloy material.

Niedrach discloses a method of forming a platinum group oxide coating on the surface of stainless steel components of a boiling water reactor to reduce stress corrosion cracking (see claim 1). Hettiarachchi discloses in-situ palladium doping or coating of stainless steel surfaces of a nuclear reactor to increase corrosion resistance (see claim 1). Lin discloses a method for preventing ^{60}Co contamination of cooling water circuits in a nuclear reactor by formation of an oxide film that act as barrier to ^{60}Co formation (see column 2, 2nd full paragraph). Carter discloses an anti-corrosion treatment process for protecting alloys containing nickel by forming a thick, chromium oxide-rich glassy film over the alloy surface. One having ordinary skill in the art would have recognized that: a) providing a metal oxide coating to a nickel base alloy material exposed to the reactor water would provide protection against deleterious effects of such harsh environment; and b) any one of the above methods could be applied to coat the surfaces of the nickel alloy containing component, prior to its use in the reactor.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of either one of the Nagase et al. (202) - Nagase et al. (269) combination or the Nishino et al. - Nagase et al. (269) combination, by the teaching of any one of Niedrach or Hettiarachchi or Lin or Carter, in order to have a method of controlling water quality in a nuclear reactor that further comprises applying a preliminary treatment to nickel base alloy material used in the feedwater heater and fuel assembly of the nuclear reactor, in order to gain the advantages thereof, as this is no more than the application of well-known techniques within the nuclear art.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over either one of the Nagase et al. (202) - Nagase et al. (269) combination or Nishino et al. - Nagase et al. (269) combination as applied to claims 1 and 2 above, and further in view of either one of Honda et al. (U.S. 4,828,790) or Midorikawa et al. (U.S. 5,995,576). Either one of the Nagase et al. (202) - Nagase et al. (269) combination or the Nishino et al. - Nagase et al. (269) combination disclose the applicant's claims except for the addition of natural zinc.

Honda et al. disclose a method for inhibition of deposition of radioactive substances on nuclear power plant components contacting reactor-cooling water containing radioactive substances. Their method involves introducing polyvalent metal cations, including zinc ions, into the reactor cooling water in a concentration of 3 ppb to

1000 ppm (see claims 1 and 3, and column 4, lines 34-39). Midorikawa et al. discloses a method of inhibiting radioactive material deposition in primary coolant structure of a nuclear power plant. Their method comprises adding a mixture of metal ions containing zinc into the primary cooling system, wherein the zinc ion concentration is limited to a maximum of 1 ppb (see claims 1 and 8). One having ordinary skill in the art would have recognized that introducing zinc in the reactor water provides the advantage reducing potential doses to cognizant plant personnel by preventing radioactive material deposition on certain primary coolant structures, systems and components.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of either one of the Nagase et al. (202) - Nagase et al. (269) combination or the Nishino et al. - Nagase et al. (269) combination, by the teaching of either Honda et al. or Midorikawa et al., in order to have a method of controlling water quality in a nuclear reactor that further comprises introducing natural zinc into the reactor water to limit a zinc ion concentration value to up to 5 ppb, in order to gain the advantages thereof, as this is no more than the application of well known techniques within the nuclear art.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 703-306-5756. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 703-306-4198. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113

RJP
June 6, 2002

HARVEY E. BEHREND
PRIMARY EXAMINER